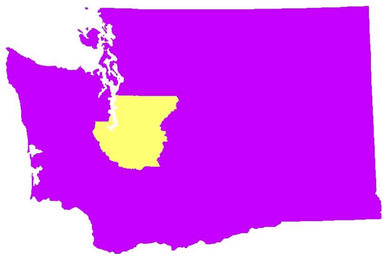
6-1-2008

Determining Health in the Puget Sound Region: Using Indicators and Demographics

Ashley Nepela
ashlen2@uw.edu



Determining Health in the Puget Sound Region: Using Indicators and Demographics

Ashley Nepela
University of Washington, Tacoma Geographic Information System Certificate Program

Introduction

Health issues that we see in modern American are often contributed to lack of exercise or genetics. However, many studies have shown that there are other socioeconomic factors that may be responsible for health issues such as diabetes, fetal death, obesity, cancer, stroke, depression and low birth rate (Link *et al.* 1995). Health and education are related, as outlined by Ross and Wu (1995), education is associated with health in three categories: work and economic conditions, socio-psychological resources and healthy lifestyles, because well-educated people have higher incomes in a full-time job with fulfilling work, and do things in moderation. Income has been shown many times to have an effect on one's health as well. The higher one's income is, the healthier that individual will be (Table 1). Fast food has been linked to diabetes and other diseases. A study by Li *et al.* (2009) found "Significant associations…between resident-level individual characteristics and *the* likelihood of being obese (BMI ≥ 30) for neighborhoods with a high-density of fast food restaurants in comparison with those with a low density". This project attempts to use physical activity as one indicator of an area's access to healthy options and by using the fast food restaurants as an unhealthy indicator. Physical activity clearly has an effect on one's health as well. Access to areas that allow for activity, however, is not always available in some areas. Layers included in this project that are used as physical activity indicators include bike lanes and parks. The purpose of this study is to compare the 'healthiness' of Pierce and King counties and to look for differences between the two by using 'healthy' and 'unhealthy' indicators.

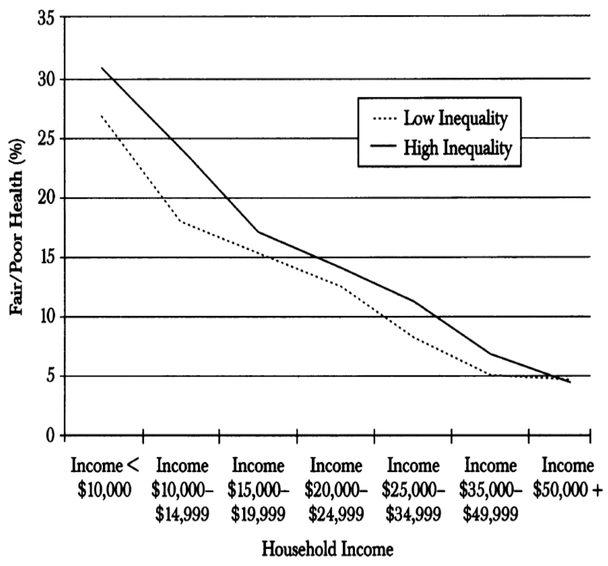


Table 1. Health of an individual according to their household income Kawachi & Kennedy (1999).

Data and Methods

The data obtained for this project included Pierce and King county: census poverty data for people ages 18-64, census education data people 25+, bike trails, grocery stores (Fred Meyer, Safeway, Albertson's, Saar's, Triple D discount, Winco, Wal-Mart Supercenter, Harbor Greens, Marlene's, Trader Joe's,), fast food restaurants (McDonald's, Burger King, Wendy's, Jack in the Box), farmers markets, parks, roads, and census places shapefile.

ArcMap: Collected and geocoded all food retailers, Interpolated poverty and education data using IDW, calculated education and poverty mean centers and created 2.5 mile buffers around and calculated percentages of each attribute within the buffers (Figures 3 & 5)

ArcScene: Used poverty rasters to show rate in 3D and set food retailer base heights equal to the raster base heights for Tacoma and Seattle mean center buffers.

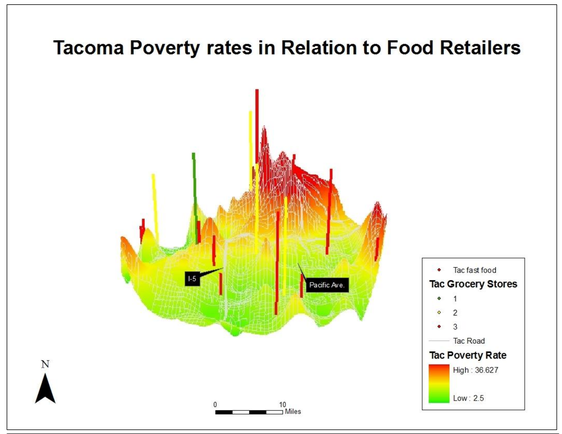


Figure 2. Tacoma, WA 2.5 mile poverty rate mean buffer and food retailers.

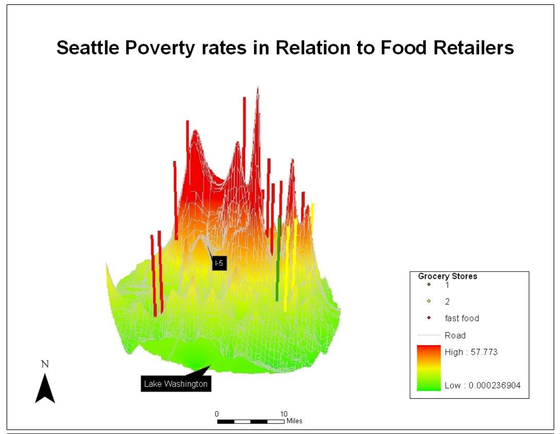


Figure 4. Seattle, WA 2.5 mile poverty rate mean buffer and food retailers.

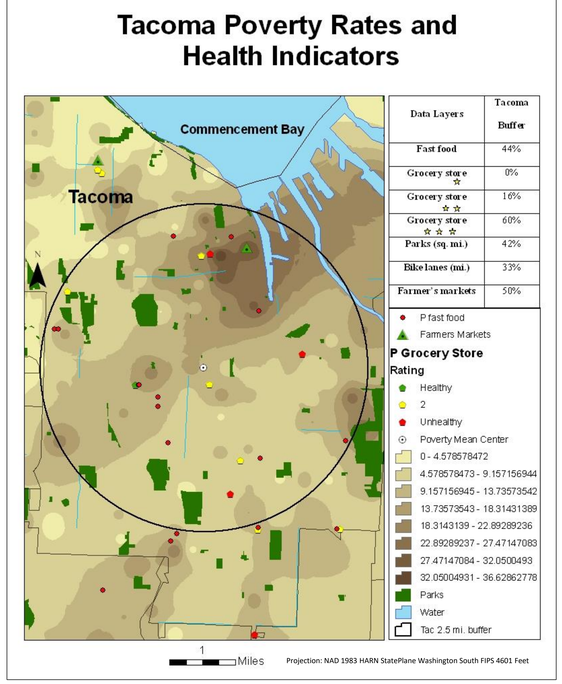


Figure 3. Tacoma, WA 2.5 mile poverty rate mean center buffer.

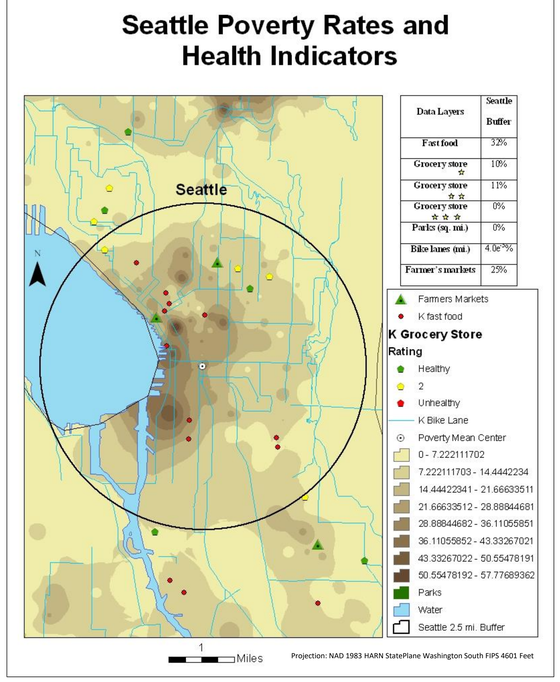


Figure 5. Seattle, WA 2.5 mile poverty rate mean center buffer.

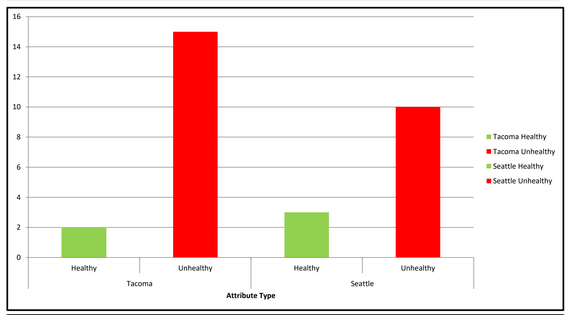


Table 1. Tacoma & Seattle 'healthy' (green) and 'unhealthy' (red) attributes.

Data Layers	Pierce	King
Fast food	67	131
Grocery store (1)	4	19
Grocery store (2)	45	88
Grocery store (3)	8	6
Parks (sq. mi.)	323	2284
Bike lanes (mi.)	49 mi.	1868 mi.
Farmer's markets	6	20

Table 2. Pierce and King counties attributes.

Results

- 'No high school attainment' and 'poverty' mean centers, in most cities in the two counties are within close proximity of one another
- Fast food restaurants are present in clusters more than they are evenly distributed.
- More unhealthy attributes were found in the poverty mean center buffers in Seattle and Tacoma (counting all parks as one attribute) (Figure 2-5)
- No parks were present in the Seattle poverty rate mean center buffer (Figure 5).
- More bike lane miles were found in the Seattle buffer than in the Tacoma buffer (Figures 3 & 5).
- The high Seattle poverty buffer levels correlate with the unhealthy food retailers (Figure 5)
- Higher poverty rates were more dispersed throughout Pierce county than King county (Figure 2 & 3).
- Farmers markets were found in lower *and* higher poverty rate areas in both the Seattle and Tacome poverty mean center buffers (Figures 3 & 5).

Future Work

Ensuring the completion of the datasets, or ground truthing the data, would be an extension of this project for an individual to accomplish. The analysis would benefit especially if the fast food restaurants and the grocery stores were verified. Adding data such as industrial density, time spent in commute, and housing costs proportioned by income would be another great extension to this work. Also, updated census data would create a better representation of the present conditions within our study area. Convenient store data may strengthen the analyses in this project.

Many disadvantaged people use convenient stores as their regular grocery stores for their everyday meals. If convenient stores were added as a layer and its attributes included the necessary data to geocode them, as well as information about the amount of grocery-type foods that were purchased at each of the stores, a better understanding of where people in those communities bought their food could come about. Also, adding gym data would be a great addition. Perhaps the gyms could be rated by their size or membership fee and whether it is a chain or more of a community center.

Works Cited

F. Li, Harmer, P., Cardinal, B., *et al.* 2009. Obesity and the Built Environment: Does the Density of Neighborhood Fast-Food Outlets Matter? American Journal of Health Promotion 23: 203-209.

C. Ross, Wu, C. 1995. The Links Between Education and Health. American Sociological Review 60:719-45.

B. Link, Phelan, J. 1995. Social Conditions as Fundamental Causes of Disease. Journal of Health and Social Behavior Extra Issue:80-94.

Acknowledgements

A special thanks to Mathew Kelley, UWT GIS Certificate Program Professor

For all of his help, encouragement, input, and patience during the process of this project.

For further information Please contact ashlen2@u.washington.edu